

Configure Optical Modules

This chapter describes how to configure the Optical Amplifier Module and Protection Switching Module (PSM).



Note When you plan to replace a configured optical module with a different type of optical module, you must clear the configurations of the old module before you install the new module. For example, when replacing a configured EDFA module with a PSM in the same slot, clear the EDFA configurations.

In general, configurations in a card equipped in an NCS 1001 slot include:

- Card configuration—hw-module parameters configuration related to the slot S where the card is equipped
- OTS controller configurations
- Optics controller configurations-only for EDFA cards

The following commands clear the configurations in the previous card.

1. no hw-module location 0/RP0/CPU0 slot <S>

Clear the card parameters configuration.

2. no controller ots Rack/Slot/Instance/Port

Clear each OTS controller configuration.

3. no controller optics Rack/Slot/Instance/Port

(Optional) Clear the controller optics configurations. This must be done only if the card previously equipped in slot *S* was an EDFA.

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Optical Amplifier Module

Table 1: Feature History

Feature Name	Release Information	Feature Description
Amplifier Behaviour	Cisco IOS XR Release 7.3.1	Grid mode configuration for the optical amplifier has been extended to support 75GHz spaced channels.
		You can optimize the optical spectrum and granularity using the gridless configuration. You can provision channels with arbitrary channel frequencies and channel widths. Up to 96 channels can be configured using the gridless configuration. Commands modified: • hw-module • show controllers

The optical amplifier module (NCS1K-EDFA) has pre-amplifier and booster amplifier.

The optical amplifier module provides the following functionality.

- Preamplifier (LINE-RX to COM-TX) Single preamplifier variant, with switchable gain ranges, according to link loss:
 - Range # 1: 0 to 24 dB gain, Tilt control: 24 to 27 gain, with tilt uncontrolled
 - Range # 2: 20 to 34 dB gain, Tilt control: 34 to 37 dB gain, with tilt uncontrolled
 - 23dBm output power @ COM-TX port
- · Booster amplifier (COM-RX to LINE-TX) True variable gain booster amplifier
 - Gain range: 1 to 20. 20 to 25 uncontrolled tilt.
 - 23dBm output power @ LINE-TX port
- ADD/DROP OSC channel supports both 1510nm and 1610nm +/-10nm
- OCM assesses channel presence and Gain regulation and per channel power monitoring.

Figure 1: EDFA Front View



1	XFP for OSC and additional OTDR feature
2	SFP for OSC (Optical Service Channel)
3	Status LED
4	Service Channel input and output port [OSC - RX, TX]
5	PRE and BST amplifier inputs and output ports
	[C (COM) - RX, TX]
	[COM - CHECK]

The following table describes the mapping of controllers and optical ports for the optical amplifier module.

Controller	Optical Ports
Ots 0/slot/0/0	• COM-RX (booster input)
	• COM-TX (preamplifier output)

Controller	Optical Ports
Ots 0/slot/0/1	• LINE-RX (preamplifier input)
	• LINE-TX (booster output)
Ots 0/slot/0/2	• OSC-RX
	• OSC-TX
Ots 0/slot/0/3	COM-CHECK

COM-CHECK CONFIGURATION

The COM-CHECK configuration is described below.

- Safety must be ensured to protect the fiber intra-node from the pre-amplifier to the Mux or Demux section for the total output power on COM-TX port upto 23 dB. This is required to compensate for an extremely lengthy span.
- If the output power on COM-TX is less than or equal to 20 dB, the com-check port may not be used and can be turned off. Also no physical connection between the pre COM-CHECK and Demux monitor port is required.
- Safety on pre is necessary in some cases such as large spans over high power requirements.
- The COM-CHECK PD9 is the safety port.
- The COM-RX like controller Ots 0/s/0/0 is not part of safety.
- The safety restart process is similar to the booster case, with some difference in the **APR Check** phase.

Amplifier Configuration

NCS 1001 supports two methods to control amplifiers.

- Manual-All the amplifier settings are controlled by the user.
- Automatic-All the amplifier settings are controlled by the internal amplifier power regulator.

UDC Port Configuration

There are three UDC RJ-45 ports on the faceplate of NCS 1001. Each port is statically associated with a slot (UDC1 to slot 1, UDC2 to slot 2 and UDC3 to slot3). UDC ports are one Gigabit Ethernet ports and the user can transmit any Ethernet traffic into these ports.

UDC traffic flows through the line, added and dropped by the OSC add/drop filters in the optical amplifier module (NCS1K-EDFA). UDC traffic flows through the line tagged. The tagging and untagging operations are performed by NCS 1001, based on the UDC VLAN specified in the configuration, without any limit on the transmitted traffic. The traffic can be tagged, multiple tagged, or untagged. However, 100% utilization cannot be achieved because four bytes of tag are added to each packet.

UDC Application for Remote Management

The following diagrams describe the application of UDC that can be used by EPNM to manage NCS 1000 series at the remote site.





Figure 3: UDC Application for Remote Management - Scenario Two



Configure Amplifier Module

configure

hw-module location 0/RP0/CPU0 slot slot-number ampli

node-type value

grid-mode value

udc-vlan value

commit

end

Example

The following is a sample in which the amplifier module is inserted in slot 3 and udc-vlan is set to 4000.

```
configure
hw-module location 0/RP0/CPU0 slot 3 ampli
[
    grid-mode 100GHz
    udc-vlan 4000
]
```

Amplifier Module Configuration Parameters

Table 2: Amplifier Module Configuration Parameters

Parameter	Description	Range/Values	Default
grid-mode	Defines the optical spectrum on the interfaces of the amplifier module.	• 100GHz-Configures the amplifier with 100GHz grid of channels with 48 channel spacing.	50GHz
		• 50GHz-Configures the amplifier with 50GHz grid of channels with 96 channel spacing.	
		 75GHz-Configures the amplifier with 75GHz grid of channels with 64 channel spacing. 	
		Note The new optical passive multiplexer and de-multiplexer module, NCS1K-MD-64-C, introduced in R7.3.1, allows you to configure the amplifier with 75GHz grid of channels.	
		• gridless-Configures the amplifier in the flex spectrum.	
node-type	Defines the type of the node in which the amplifier is set to work.	TERM, ILA	TERM
udc-vlan	Defines the VLAN associated to the selected slot and its UDC port.	2 to 4080	

Configure Flex Channels on the Amplifier Module

You can optimize the optical spectrum and granularity using the gridless configuration. In gridless configuration, the fixed ITU-T grid that defines specific channel frequencies and channel widths is not taken into account. You can provision channels with arbitrary channel frequencies and channel widths. You can configure up to 96 channels using the gridless configuration.

Note

Automatic Power Control (APC) regulation in gridless configuration is based on controller ampli-channel-psd parameter.

configure

hw-module location 0/RP0/CPU0 slot slot-number ampli flex-mode

hw-module location 0/RP0/CPU0 slot slot-number ampli grid-mode gridless

hw-module location 0/RP0/CPU0 slot *slot-number* **ampli flex-chan-id** *channel-id* **chan-central-freq** *frequency* **chan-width** *width*

commit

end



Note The new channel is configured only if it does not overlap with the existing channel.

Table 3: Flex Channel Configuration Parameters

Parameter	Description	Range/Values
flex-chan-id	Defines the channel identifier.	1 to 96
chan-central-freq	Defines central frequency of the channel.	191350 to 196100 in multiples of 125
chan-width	Defines the width of the channel.	500 (50.0 GHz) to 8000 (800.0 GHz) in multiples of 12.5 GHz

Example

The following is a sample in which the amplifier module is configured in flex spectrum.

```
configure
hw-module location 0/RP0/CPU0 slot 2 ampli flex-mode
hw-module location 0/RP0/CPU0 slot 2 ampli grid-mode gridless
hw-module location 0/RP0/CPU0 slot 2 ampli flex-channel-id 5
chan-central-freq 1931750 chan-width 6500
commit
end
```

The following sample shows the configured channel with its frequency and width.

RP/0/RP0/CPU0#show controllers ots-och 0/2/0/0/5 summary

Fri Oct	9 10:43:44	.002 CE	ST			
Port	Туре	Status	TX Pow	er RX	K Power	
			(dBm)	(dBm)	
Ots-Och0	2_0_0_5	Com	N/A	-8.60	-	8.90
TX psd	RX psd		Central		Channel	Width
(nW/MHz)	(nW/MHz)		Frequency	(GHz)	(GHz)	

0.410	0.450	193175.0	650.0
RP/0/RP0/	CPU0#show controll	ers ots-och 0/2/0/0/5	5
Fri Oct	9 10:46:33.046 CES	Т	
Controll	er State: Up		
Transpor	t Admin State: Mai	ntenance	
Port Typ	pe: Com		
Laser St	ate: Unknown		
Optics S	Status::		
	Alarm Status:		
	Detected Alarms: N	lone	
	Alarm Statistics:		
	LOW-RX-PWR = 0		
	LOW-TX-PWR = 0 RX-LOS-P = 0		
	RX-LOC = 0		
	AMPLI-GAIN-DEG-LOW	<i>i</i> = 0	
	AMPLI-GAIN-DEG-HIG	H = 0	
	AUTO-LASER-SHUT =	0	
	AUTO-POW-RED = U	SABLED = 0	
	AUTO-AMPLI-CFG-MIS	MATCH = 0	
	SWITCH-TO-PROTECT	= 0	
	AUTO-AMPLI-CTRL-RU	NNING = 0	
	Parameter Statisti	.cs:	
	TX Power = -8.60 d	lBm	
	RX Power = -8.90 d	lBm	
	TX psd = $0.440 \text{ nW}/$	MHz	
	RX psd = $0.450 \text{ nW}/$	MHz	
	Channel Central Fr Channel Width = 65	equency = 193175.	0 GHz
	enamier wrach vo		
	Configured Paramet	ers:	
	Rx Low Threshold =	-25.0 dBm	
	Tx Low Threshold =	-25.0 dBm	

Modify Central Frequency and Channel Width on the Amplifier Module

You can change the central frequency, channel width, or both for a configured channel ID. The channel ID cannot be arbitrarily changed before unconfiguring the channel.

Example

The following sample changes the central frequency of the channel.

hw-module location 0/RP0/CPU0 slot 1 ampli flex-channel-id 24 chan-central-freq 1949000 chan-width 500

The following sample changes the channel width for the same channel.

hw-module location 0/RP0/CPU0 slot 1 ampli flex-channel-id 24 chan-central-freq 1949000 chan-width 1500

The following sample changes both the central frequency and channel width of the channel.

hw-module location 0/RP0/CPU0 slot 1 ampli flex-channel-id 24 chan-central-freq 1932625 chan-width 6125

In-Line Amplifier

The optical amplifier module (NCS1K-EDFA) can be configured in In-line amplifier (ILA) mode. ILA mode is used when it is not possible to connect to terminal nodes with a single span. ILA mode is supported only in slots 1 and 3.

ILA mode supports only the operation of preamplifier in the two directions. The booster module is switched off in ILA mode. ILA mode supports gain range 1 and 2 of the preamplifier and provides 23dBm output power pre-amplification.

In the ILA mode, the LINE-RX and COM-TX ports of the optical amplifier module are enabled whereas the LINE-TX and COM-RX ports of the optical amplifier module are disabled. OCM reports LINE-RX and COM-TX port values whereas LINE-TX and COM-RX port values are set to -40.00 dBm. In the ILA mode, the LINE-RX terminates on the LINE-RX on the optical amplifier module whereas the LINE-TX terminates on the external OSC module (15216-FLD-OSC=).

Figure 4: ILA Optical Diagram



Configure Amplifier Module in ILA Manual Mode

When the amplifier is set to ILA, all the configurations are performed only on the pre-amplifier. After the node is set to ILA, the amplifier gain, RX-low threshold, and the amplifier tilt can be configured on the pre-amplifier.

configure

hw-module location 0/RP0/CPU0 slot slot-number ampli node-type value

commit

end

controller controllertype Rack/Slot/Instance/Port

ampli-control-mode {automatic | manual}

ampli-gain value

rx-low-threshold value

ampli-tilt value

commit

end

Example

The following is a sample in which the amplifier module is configured in ILA manual mode. The node type is set to ILA. This parameter switches off the booster side and activate safety between slots 1 and 3.

```
configure
    hw-module location 0/RP0/CPU0 slot 3 ampli node-type iLA
    commit
    end
    controller ots 0/3/0/0
    ampli-control-mode manual
    ampli-gain 200
    rx-low-threshold -300
    ampli-tilt -10
    commit
end
```

Configure Amplifier Module in ILA Automatic Mode

The configurations performed on the amplifier module in ILA automatic mode are similar to the configurations performed on the terminal node. The configurations are performed only on the pre-amplifier as the booster is switched off in ILA mode.

configure

hw-module location 0/RP0/CPU0 slot slot-number ampli

grid-mode value

node-type value commit end controller controllertype Rack/Slot/Instance/Port ampli-control-mode {automatic | manual} ampli-channel-power value ampli-tilt value rx-low-threshold value channel-power-max-delta value ampli-gain value ampli-gain value ampli-gain-range {normal | extended} commit end

Example

The following is a sample in which the amplifier module is configured in ILA automatic mode.

```
configure
    hw-module location 0/RP0/CPU0 slot 3 ampli
    grid-mode 50GHz
    node-type iLA
    commit
    end
    controller ots 0/3/0/0
    ampli-control-mode automatic
    ampli-channel-power 30
    ampli-tilt -10
    rx-low-threshold -331
    ampli-gain 220
    ampli-gain-range extended
    commit
end
```

The following is a sample of **show running-config** command.

```
line console
exec-timeout 0 0
!
line default
exec-timeout 0 0
session-timeout 0
!
ntp
server 10.58.228.1
update-calendar
!
hw-module location 0/RP0/CPU0 slot 1
ampli udc-vlan 11
ampli grid-mode 50GHz
ampli node-type ILA
```

```
1
hw-module location 0/RP0/CPU0 slot 3
ampli udc-vlan 10
ampli grid-mode 50GHz
ampli node-type ILA
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.58.229.143 255.255.252.0
interface MgmtEth0/RP0/OSC1/0
shutdown
1
interface MgmtEth0/RP0/OSC2/0
shutdown
Т
interface MgmtEth0/RP0/OSC3/0
shutdown
controller Ots0/1/0/0
ampli-tilt -12
ampli-control-mode automatic
ampli-channel-power 22
channel-power-max-delta 45
controller Ots0/1/0/1
rx-low-threshold -250
1
controller Ots0/3/0/0
ampli-tilt -12
ampli-control-mode automatic
ampli-channel-power 22
channel-power-max-delta 45
!
controller Ots0/3/0/1
rx-low-threshold -250
!
router static
address-family ipv4 unicast
 0.0.0.0/0 10.58.228.1
1
1
netconf-yang agent
ssh
!
ssh server v2
end
```

Gridless OCM Support

Overview

The Gridless OCM (Optical Channel Monitor) support feature is introduced to support transponders with channel width between 50GHz to 100GHz. In R7.1.1, the channel width can be set between 50GHz to 800GHz in multiples of 25GHz. In the gridless mode, the amplifier gain is calculated using the power spectral density parameter and not the per channel power parameter. The flex grid provides the capability to support 600G interface of NCS 1004.

Limitation

• The setting of a channel width disables the nearest channels.

Configure the Channel Width

The channel width can be set between 1000 and 8000.

The following command configures the channel width as 100GHz. This means that the channels are spaced on eight slices at 12.5GHz each.

```
hw-module location 0/RP0/CPU0 slot 1 ampli flex-mode channel-id 1 channel-width 1000
```

The following command configures the channel width as 800GHz. This means that the channels are spaced on eight slices at 100GHz each.

```
hw-module location 0/RP0/CPU0 slot 1 ampli flex-mode channel-id 10 channel-width 8000
```

Protection Switching Module

The protection switching module (NCS1K-PSM) provides the following functionality.

- In TX section:
 - Splits input optical channels to both working and protection lines.
 - Forces the switch in the remote site by opening one of the two line paths (by putting the related VOA in AVS).
- In RX section:
 - Selects the signals from working or protection line. Each line is monitored through a PD.
 - Balances the two line losses by changing the VOA attenuation value at the same time of the switch change of state.

Figure 5: PSM Front View



1	Protected path input and output port [P - RX, TX]
2	Working path input and output port [W - RX, TX]
3	COM input and output port [COM - RX, TX]
4	Status LED

Controller	Optical Ports
Ots 0/slot/0/0	COM-TX
Ots 0/slot/0/1	Working path input and output port [W - RX, TX]
Ots 0/slot/0/2	Protected path input and output port [P - RX, TX]

The following table describes the mapping of controllers and optical ports for the protection switching module.

Configure Protection Switching Module

The following table explains the possible configuration on Protection Switching Module:

PSM Module Configuration Parameters

Table 4: PSM Module Configuration Parameters

Parameter	Description	Range/Values
lockout-from	Excludes the selected port from protection.	Working and Protected
	Triggers a switch when the active port is specified in the lockout.	
	For example, configuring a lockout-from working port triggers a switch to protect when working port is the active one.	
	While lockout-from protected port triggers a switch to working when protected port is the active one.	
path-protection	Enables the PSM path protection.	
section-protection	Enables the PSM section protection.	
uni-dir	Enables the PSM uni directional (in switches only).	
auto-threshold	Enables the PSM auto threshold setting.	

Example

The following is an example of configuration of a lockout from working in which the PSM is inserted in slot 2.

conf t

#hw-module location 0/RP0/CPU0 slot 2 psm lockout-from "working"
commit

You can apply manual switching by using the following command:

hw-module slot slot number manual-switch-to working | protected

The switch by user command from the path without the ILA node in the middle is performed bi-directionally. If the ILA and terminal nodes are in section-protection, the manual and lockout switch command from the path with ILA node in the middle are performed uni-directionally.

Note	FPD upgrade on FW PSMv1 from FW 1.43 and FW 1.44 to FW 1.45 affects the traffic.

(From R6.2.1) Section Protection

Figure 6: Section Protection Topology



See the PSM Module Configuration Parameters section to set the section-protection parameter on both the PSMs. Ensure that the PSM in a section protection topology is inserted in slot 2. Connect the EDFA in slot 1 to the Protected port of the PSM and EDFA in slot 3 to the Working port of the PSM.

Ø

Note To measure the correct switching time while testing the section protection topology, we recommend you to wait for 120 seconds between two subsequent switching events (or between a switching event and the restoration). This waiting period allows the EDFAs to stabilize after the first switching occurrence, thus avoiding the power at the PSM to oscillate around the threshold.

(From R6.3.2) Path Protection

Figure 7: Path Protection Topology



See the PSM Module Configuration Parameters section to set the path-protection parameter on both the PSMs.

Protection Switching Module with Manual Threshold

The switch can operate in all conditions, if it is set in Autothreshold.

When the path protection is configured with a manual threshold, you must ensure that:

- During the first installation, the value on the PSM RX-low Threshold should be set as 3 dB below the minimum power for a single channel. The value must ensure that the PSM is able to switch on with a single channel or when the EDFA is in APR (+8 dBm).
- When the system is up and running with the final number of channels, the PSM RX-low Threshold must be set 3 dB below the target power.
- After a fiber cut and restore, in order to ensure that the PSM is able to switch on, it is necessary to set the value of PSM RX-low Threshold similar to the value set during the first installation.

The PSM Auto-threshold configuration is highly recommended for a three-way topology.

In a three-way topology, when the path protection is configured with a manual threshold, you must follow the above steps. If you did not configure all the above steps properly, you may encounter the following issues:

- Switch may not be bidirectional.
- Double switch on PSM in path protection, when set in three-way configuration.

It is possible to configure parameters such as rx-enable, tx-enable in OTS controllers (1 or 2, i.e. working or protected port) of PSM card.

For more information on OTS controllers, see Configure OTS Controller.

Autothreshold for Protection Switching Module

When auto-threshold is not enabled, the RX-low threshold value active on PSM working and protected RX-ports can either be set by the user or the default values can be used.

The current threshold is the configured parameter if the values set are available in the show controller command output. The current value is -38dBm (default values), if the user doesn't have configured any value for those parameters.

If auto-threshold is enabled on the PSM, the RX-low thresholds values for port 1 and 2 configured by the user are ignored (current thresholds is not the configured parameter). When the auto threshold is enabled on the PSM card:

- If optical Power at Working-RX and Protected-RX port is stable (+/- 1 dB) for 2 minutes, related RX-Low threshold is automatically set to RX power – 3dB.
- If power is not stable, the releated thresholds do not change.
- W-RX and P-RX are regulated independently.

The LOS-P behavior on the auto-threshold are:

- When a LOS-P alarm is detected on the working or protected RX-port, in case of auto-threshold is enabled, the related threshold remains the same. This behavior happens when the RX power is less than the related threshold on the RX-port working or protected.
- When the LOS-P alarm is cleared in the first 30 seconds, the ordinary auto-threshold mechanism is applied. This behavior happens after 2 minutes of stable RX-power and when the RX-low threshold is changed to the new RX power -3 dB.

- When the LOS-P is present after 30 seconds, the RX-low threshold is automatically moved to the values set by the user.
- When the LOS-P is cleared, the ordinary auto-threshold mechanism is applied again. This behavior happens when the RX power is higher than the related current threshold.

Configure rx-low-threshold for PSM

You must configure the **rx-low-threshold** parameter before enabling auto-threshold on PSM.

PSM auto-threshold feature monitors the W-RX/P-RX ports of the PSM module for actual received power. When the received power is stable, the feature sets the **rx-low-threshold** value of the W-RX/P-RX ports with the current power value. The current value of the threshold is set to 3 dB lower than the received power. If there is LOS at the W-RX/P-RX ports due to fiber cut or temporary disruption of received power, the feature restores the **rx-low-threshold** value of the W-RX/P-RX ports to the configured value.

We recommend to configure both the **rx-low-threshold** and **auto-threshold** values of the PSM module according to the following guidelines:

Configure PSM W/RX Threshold (Ots0_2_0_1/Working) with Amplifier Control Mode as Manual

1. show hw-module slot 3 channel-trail-view active

Channel Trail Vie	ew - Active	- dBm				
PRE: 1/I.TI	NE=>0/COM				BST: 0/COM=	>1/LINE
Och Name Ware Ware Och Name Ware Ware Och Name Ware Och Name Ware Och Name Name Name Name Name Name Name Name	avelength(nm)Freq(GHz)	Width(GHz)Rx pwr(dBm)	Tx pwr(dBm)	Rx pwr(dBm)
Ots-Och0_2_0_0_1 6.20	1528.77	196100.0	50.0	-6.10	-4.90	-2.50
Ots-Och0_2_0_0_2 6.50	1529.16	196050.0	50.0	-5.90	-4.60	-2.20
Ots-Och0_2_0_0_3 6.30	1529.55	196000.0	50.0	-6.00	-4.80	-2.30
Ots-Och0_2_0_0_4 6.20	1529.94	195950.0	50.0	-6.10	-4.90	-2.40
Ots-Och0_2_0_0_5 6.00	1530.33	195900.0	50.0	-6.30	-5.20	-2.60
Ots-Och0_2_0_0_6	1530.72	195850.0	50.0	-6.50	-5.30	-2.80

Examine the **PRE: 1/LINE=>0/COM** column in the command output and choose the lowest channel **Tx pwr** value from all the active channels.

2. configure

3. controller ots 0/2/0/1 rx-low-threshold 49

Set the threshold value manually to (lowest channel Tx power -1 dBm). In the above example, channel Ots-Och0_2_0_0_6 is at the lowest Tx power 5.90 dBm. Hence, the threshold value on PSM W/RX port will be 5.90 - 1 = 4.90 dBm.

If the system works without any grid mode configuration, the channel-trail-view command is not available because channel mapping configuration is not available.

To identify the lowest channel Tx pwr value, use the following show command.

show controllers ots0/3/0/0 spectrum-info

Tx power :		
spectrum-slice num	Tx-power values (dBm)	
1 - 8	-47.20 -47.20 -47.20 -36.40 -47.20 -47.20 -47.20 -47.20	
9 - 16	-47.20 -47.20 -43.70 -43.70 -47.20 -36.60 -47.20 -43.20	
17 - 24	-47.20 -35.80 -47.20 -47.10 -41.90 -43.20 -42.20 -40.30	
25 - 32	-40.30 -47.20 -41.70 -41.70 -37.50 -47.20 -47.20 -41.90	
33 - 40	-41.90 -47.20 -45.90 -42.10 -42.10 -46.30 -41.60 -39.10	
41 - 48	-41.20 -47.20 -35.80 -45.10 -45.30 -45.30 -40.10 -40.10	
49 - 56	-45.50 -42.60 -45.30 -47.20 -47.20 -40.50 -47.20 -45.80	
57 - 64	-38.60 -40.30 -40.30 -47.20 -47.20 -39.40 -43.10 -43.10	
65 - 72	-42.20 -42.20 -47.20 -47.20 -38.80 -47.20 -47.20 -41.30	
73 - 80	-47.20 -43.00 -40.10 -40.10 -47.20 -36.10 -39.40 -45.70	
81 - 88	-47.20 -41.50 -39.00 -42.50 -47.20 -47.20 -34.30 -47.20	
89 - 96	-47.20 -47.20 -39.90 -39.70 -47.20 -47.20 -47.20 -47.20	
97 - 104	-47.20 -45.10 -39.90 -41.30 -47.20 -39.80 -37.80 -42.00	

All the slice power values are expressed in PSD (Power Spectral Density) units of measure [dBm/12.5GHz]. Each slice value is converted to linear mWatt using the formula $10^{(N/10)}$. For example, $-20 \text{ dBm} = 10^{(-20/10)} = 0.01 \text{ mWatt}$ and $0 \text{ dBm} = 10^{0} = 1 \text{ mWatt}$.

Each slice group that composes a channel will be algebraically added to obtain the integral channel power. For example, the first channel of 50GHz occupies the slice range [1-4], 2nd channel [5-8] and so on. The first channel of 75GHz occupies the slice range [1-5],[6-11] and so on. The first channel of 100 GHz occupies the slice range [1-6],[7-14] and so on.

Each channel power that falls below the **rx-low-threshold** value is excluded from the list of active channels. The channel that has the least value above the **rx-low-threshold** value is chosen.

Configure PSM P/RX Threshold (Ots0_2_0_2/Protected) with Amplifier Control Mode as Manual

1. show hw-module slot 1 channel-trail-view active

Channel Trail	View - Active	- dBm				
			=====		BST: 0/COM	=>1/LINE
Och Name Tx pwr(dBm)	Wavelength(nm)Freq(GHz)	Width(GHz)Rx pwr(dBm)	Tx pwr(dBm)	Rx pwr(dBm)
Ots-Och0_2_0_ 5.00	0_1 1528.77	196100.0	50.0	-6.10	-4.90	-2.50
Ots-Och0_2_0_ 5.20	0_2 1529.16	196050.0	50.0	-5.90	-4.60	-2.20
Ots-Och0_2_0_	0_3 1529.55	196000.0	50.0	-6.00	-4.80	-2.30

5.10 Ots-Och0_2_0_0_4 1529.94 195950.0 50.0 -6.10 -4.90 -2.40 5.00 Ots-Och0 2 0 0 5 1530.33 195900.0 50.0 -6.30 -5.20 -2.60 5.00 195850.0 -5.30 Ots-Och0_2_0_6 1530.72 50.0 -6.50 -2.80 4.80

Examine the **PRE: 1/LINE=>0/COM** column in the command output and choose the lowest channel **Tx pwr** value from all the active channels.

- 2. configure
- 3. controller ots 0/2/0/2 rx-low-threshold 38

Set the threshold value manually to (lowest channel Tx power -1 dBm). In the above example, channel Ots-Och0_2_0_0_6 is at the lowest Tx power 4.80 dBm. Hence, the threshold value on PSM W/RX port will be 4.80 - 1 = 3.80 dBm.

Configure PSM W/RX Threshold (Ots0_2_0_1/Working) with Amplifier Control Mode as Automatic

1. show controllers ots 0/3/0/0

Configured Parameters: ------Ampli Channel power = 0.00 dBm

Examine the ampli-channel-power Tx value in the command output.

- 2. configure
- 3. controller ots 0/2/0/1 rx-low-threshold -10

Set the threshold value manually to (ampli-channel-power -1 dBm). In the above example, **ampli-channel-power Tx** value is 0 dBm. Hence, the threshold value on PSM W/RX port will be 0 - 1 = -1 dBm.

Configure PSM P/RX Threshold (Ots0_2_0_2/Protected) with Amplifier Control Mode as Automatic

1. show controllers ots 0/1/0/0

Configured Parameters:

Ampli Channel power = 2.00 dBm

Examine the **ampli-channel-power Tx** value in the command output.

- 2. configure
- 3. controller ots 0/2/0/2 rx-low-threshold 10

Set the threshold value manually to (ampli-channel-power -1 dBm). In the above example, **ampli-channel-power Tx** value is 2 dBm. Hence, the threshold value on PSM W/RX port will be 2 - 1 = 1 dBm.

Enable Autothreshold for PSM

Before You Begin

Configure rx-low-threshold for PSM, on page 18

This procedure enables automatic thresholds for PSM. The configuration to set auto threshold mechanism are:

configure

hw-module location 0/RP0/CPU0 slot slot number psm auto-threshold

commit

end

slot number is the slot where the PSM is inserted.

Example

The following is a sample for enabling autothreshold on a PSM equipped in slot 1.

```
RP/0/RP0/CPU0:MYS-237#configure terminal
RP/0/RP0/CPU0:MYS-237(config)#hw-module location 0/RP0/CPU0 slot 1 psm auto-threshold
RP/0/RP0/CPU0:MYS-237(config)#commit
eRP/0/RP0/CPU0:MYS-237(config)#end
```

Configure Relative Switch Threshold for PSM

Relative switch threshold allows you to manually configure the delta threshold on PSM at which the working path switches to the protected path. Relative switch threshold can be configured on PSM only if **auto-threshold** or **revertive wtr** are not configured. You can configure the relative switch threshold using the following commands:

configure terminal

hw-module location 0/RP0/CPU0 slot *slot number* psm relative-switch-threshold *value* relative-switch-threshold-offset *value*

commit

end

For more information about these commands, see Command Reference for Cisco NCS 1001.

Example

```
RP/0/RP0/CPU0:MYS-237#configure terminal
RP/0/RP0/CPU0:MYS-237(config)#hw-module location 0/RP0/CPU0 slot 1 psm
relative-switch-threshold 120 relative-switch-threshold-offset -150
RP/0/RP0/CPU0:MYS-237(config)#commit
eRP/0/RP0/CPU0:MYS-237(config)#end
```

Automated OTS-OCH Thresholds on Amplifier

The automated OTS-OCH thresholds can be enabled or disabled on each EDFA (Erbium Doped Fiber Amplifier) card equipped on the node itself. It applies on the EDFA OTS controllers and on all the related OTS-OCH controller ports.

When the automatic threshold function is enabled on the amplifier, the threshold value to set is determined using the following formula:

rx-low-threshold = (Remote AmplChannel - RXSpanloss)-User Threshold Offset.

Where

Remote AmplChannel is the ampli channel power set on the remote node for ots controller tx port of remote EDFA.

RXSpanloss is the RX Span Loss calculated on the local node.

User Threshold Offset is the ampli-auto-rxlow-threshold threshold-offset set on the local node for EDFA in slot 1.

Any modification to each of the parameters included in the formula does not automatically account for the calculation of the rx-low threshold value. To calculate a different rx-low-threshold value correspondingly, you must execute the following CLI command:

hw-module slot<n>ampli-auto-rxlow-threshold threshold-offset <value>

Example: hw-module slot 1ampli-auto-rxlow-threshold threshold-offset 400

Command Parameters:

- <n> (1,2 3): This parameter designates the specific slot where the EDFA card is installed within the device.
- <value> (0-800): This parameter represents the desired adjustment to the Amplifier RX-LOW threshold, specified in tenths of dBm.

Limitations

• This feature works, only if the user has configured span loss calculation. Refer Span Loss Calculation section in the Configure Controllers chapter of the configuration guide.

Configure Automatic Thresholds

This procedure enables automatic thresholds for EDFA. The configuration to set automatic threshold mechanism are:

configure terminal

hw-module location 0/RP0/CPU0 slot slot number ampli auto-threshold

commit

end

slot number is the slot where the EDFA is inserted.

Example

The following is a sample for enabling autothreshold on an EDFA inserted in slot 1.

```
RP/0/RP0/CPU0:MYS-237#configure terminal
RP/0/RP0/CPU0:MYS-237(config)#hw-module location 0/RP0/CPU0 slot 1 ampli auto-threshold
RP/0/RP0/CPU0:MYS-237(config)#commit
eRP/0/RP0/CPU0:MYS-237(config)#end
```

Verification

The following is a sample for checking whether the auto-threshold is configured.

```
#show running hw-module location 0/RP0/CPU0 slot 1 ampli
....
ampli span-loss
ampli node-type TERM
ampli remote-node local-ipv4 10.58.xxx.xxx remote-ipv4 10.58.xxx.xxx remote-slot-id 3
ampli auto-threshold
```

PSM Virtual Photodiode

Protection Switching Module (PSM) Virtual diode provides an optical power reading even if photodiodes are not available. PSM does not have photodiode on COM-RX. There are two photodiodes on Working-TX and Protected-TX present after the VOA.

The value of power on Com-RX is real, if at least one value between the W-TX and the P-TX power is not equal to -40 dB (related port in AVS).

When both the power of W-TX and P-TX are equal to -40dB (both related VOA in AVS-Automatic VOA Shutdown), it is impossible to calculate the real power on Com-RX port, and the value will be shown as -40dB.

The feature does not require any configuration. There is a change only in the *show controllers ots* 0/<*slot*>/0/0 command, which shows the RX power on Com-RX port. RX low power alarm is not managed on Com-RX port.

Example for show controller

RP/0/RP0/CPU0:ios#show controllers ots 0/2/0/0

Wed Jan 24 14:33:22.898 CET Controller State: Up Transport Admin State: In Service Port Type: Com Laser State: Unknown Optics Status:: Alarm Status: ______ Detected Alarms: None

Alarm Statistics:

```
LOW-RX-PWR = 0
LOW-TX-PWR = 0
RX-LOS-P = 0
RX-LOC = 0
AMPLI-GAIN-DEG-LOW = 0
AMPLI-GAIN-DEG-HIGH = 0
AUTO-LASER-SHUT = 0
AUTO-POW-RED = 0
AUTO-AMPLI-CTRL-DISABLED = 0
AUTO-AMPLI-CFG-MISMATCH = 0
SWITCH-TO-PROTECT = 0
AUTO-AMPLI-CTRL-RUNNING = 0
Parameter Statistics:
TX Power = 15.30 dBm
RX Power = 5.30 dBm
tx-enable = 1
rx-enable = 1
Configured Parameters:
_____
tx-enable = 1
rx-enable = 1
```

PSM 3-way Protection

NCS 1001 supports Protection Switching Module (PSM) 3-way protection scheme formed by combining a Section Protection scheme with a Path Protection scheme. There is no configuration change required in PSM to implement the PSM 3- way protection scheme. The Path Protection scheme is in the middle of one of the two paths of Section Protection scheme.

For the outer section protection it is suggested to use the PSM automatic threshold configuration.

Figure 8: 3-way Protection Network Topology

Figure 9: 3-way Protection Network Topology



The 3-way Protection Scheme has the following limitations:

- For each PSM switching the bi-directionality is not definite.
- The manual switching used to change the active path is sometimes unsuccessful.

The lockout configuration is recommended to control the switching operation from one path to another on all the 4 PSMs of the protection scheme. The lockout configuration must be applied on both local and corresponding remote PSM to ensure the bi-directionality.

PSM Revertive Switch

When an LOS (Loss of Signal – Payload) alarm occurs on the primary path due to fiber cut, traffic moves from primary to secondary path. PSM revertive switch features allows the traffic to move to the primary path from secondary path when the fiber cut is resolved and the LOS alarm is cleared on the primary path. The traffic switch to the primary path is not immediate and depends on the following parameters.

Parameters of PSM Revertive Switch

- WTR (Wait To Restore Time): WTR is the time delay (in seconds) introduced after LOS alarm on the primary path is cleared. When WTR timer elapses, traffic moves to the primary path.
- Threshold hysteresis: Threshold hysteresis parameter is required to avoid transient or flipping power readings in the region near the threshold which is monitoring the primary rx port.

Threshold hysteresis parameter, if set, works in combination with WTR timer. After the fiber cut is fixed and alarm is cleared, the system starts the WTR timer only when the power on primary rx port becomes higher than the sum of rx-low-threshold and threshold hysteresis (rx-low-threshold-delta) values. When WTR timer elapses, traffic moves to the primary path.



Note The suggested values for WTR and threshold hysteresis parameters are 120 seconds and 1.0 dBm respectively. Both the parameter values must be properly chosen based on different conditions such as power received, type of PSM protection scheme, manual threshold values provisioned on PSM or auto-threshold enabled, and so on.

Limitations

- PSM revertive switch feature is supported only on section protection or path protection schemes.
- PSM revertive switch feature is not supported on PSM 3-way protection scheme.
- PSM revertive switch feature is not supported on section protection or path protection schemes involving one or more ILA nodes.
- PSM revertive switch feature works only in case of switch from primary to secondary path due to fiber cut and not in case of switch from primary to secondary path due to user commands such as manual-to or lock-out-from.

Configure PSM Revertive Switch

configure

hw-module location 0/RP0/CPU0 slot slot-number psm revertive wtr wtr-value primary-path path commit

end

wtr-value must be an integer. The primary path is set to WORKING by default. The user can change this path from WORKING to PROTECTED but cannot delete it.

Example

The following is a sample of configuring the WTR parameter of PSM revertive switch in which the PSM module is inserted in slot 2 and primary path is set to working.

```
configure
hw-module location 0/RP0/CPU0 slot 2 psm
revertive wtr 120
primary-path WORKING
commit
end
```

The following is a sample of configuring the threshold hysteresis parameter of PSM revertive switch.

```
configure terminal
controller 0/2/0/1 rx-low-threshold-delta 10
commit
end
```

rx-low-threshold-delta is the threshold hysteresis. The value 10 is expressed in units of 0.1 dBm. In the above example, the value of threshold hysteresis is set as 1.0 dBm.

Example of show controller

RP/0/RP0/CPU0:ios# show controllers ots 0/2/0/1

```
Controller State: Up
 Transport Admin State: In Service
 Port Type: Working
 Port Status: Standby
 Laser State: Unknown
 Optics Status::
        Alarm Status:
         _____
        Detected Alarms:
        Alarm Statistics:
         _____
        LOW-RX-PWR = 0
        LOW-TX-PWR = 0
        RX-LOS-P = 735
        RX-LOC = 0
        AMPLI-GAIN-DEG-LOW = 0
        AMPLI-GAIN-DEG-HIGH = 0
        AUTO-LASER-SHUT = 0
        AUTO-POW-RED = 0
        AUTO-AMPLI-CTRL-DISABLED = 0
        AUTO-AMPLI-CFG-MISMATCH = 0
```

```
Rx Low Threshold = -38.0 dBm
RX Voa Attenuation = 0.0 dB
TX Voa Attenuation = 0.0 dB
TX Enable = Enabled
RX Enable = Enabled
Rx Low Threshold Delta = 1.0 dBm
```

OSC

OSC (Optical Service Channel) is an out-band channel added and dropped into the optical amplifier module. The wavelengths supported by OSC are 1510 nm and 1610 nm.

OSC provides a communication channel for the following types of traffic.

- Traffic coming from a UDC port
- Traffic for remote management of NCS 1001

Remote Management

Remote Management feature, introduced in R6.3.1, allows to configure the IP addresses of the local and remote nodes, to remotely manage NCS 1001.

Three OSC interfaces are configured to support remote management. The OSC interfaces are configured to provide static routes to remote nodes. Each OSC interface is statically associated with a slot (OSC1 to slot 1, OSC2 to slot 2, and OSC3 to slot3).

Configuration Steps

- 1. Configure Management and OSC Interfaces
- 2. Configure Static Routes

Network Topology Discovery

Network topology discovery feature based on OSPF protocol, introduced in R6.3.2, allows to discover NCS 1001 nodes connected to each other through OSC links without configuring the static routes. This feature checks for compatibility only between NCS 1001 nodes.

OSPF must be properly configured on the NCS 1001 nodes by defining the name, router ID, interfaces in the Area 0 section, and optionally, configuring the interfaces as passive. OSPF and OSPFv3 protocols are supported.

The following network topologies are supported.

- · Point to Point
- Point to Point with ILA nodes (up to three ILA nodes)

Configuration Steps

- 1. Configure Management and OSC Interfaces
- 2. Configure OSPF Routes

Configure Management and OSC Interfaces

configure

interface mgmtEth rack/slot/instance/port

ipv4 address ipv4-address subnet-mask

shutdown

exit

Example

The following are samples of configuring the management and OSC interfaces.

```
configure
interface MgmtEth 0/RP0/CPU0/0
ipv4 address 10.58.227.198 255.255.255.0
shutdown
exit
configure
interface MgmtEth 0/RP0/OSC1/0
ipv4 address 10.1.1.1 255.255.255.0
shutdown
exit
configure
interface MgmtEth 0/RP0/OSC2/0
ipv4 address 10.1.2.1 255.255.255.0
shutdown
exit
```

```
configure
interface MgmtEth 0/RP0/OSC3/0
ipv4 address 10.1.3.1 255.255.255.0
shutdown
exit
```

Configure Static Routes

This procedure configures all the static routes into the NCS 1001 node.

configure

router static address-family ipv4 unicast 0.0.0/0 default-gateway

exit

Example

The following sample shows the NCS 1001 node connected to three different nodes using static routes.

```
configure
router static address-family ipv4 unicast
0.0.0.0/0 MgmtEth 0/RP0/CPU0/0 10.58.227.1
10.1.1.0/24 MgmtEth 0/RP0/OSC1/0 10.1.1.2
10.1.2.0/24 MgmtEth 0/RP0/OSC2/0 10.1.2.2
10.1.3.0/24 MgmtEth 0/RP0/OSC3/0 10.1.3.2
exit
```

Configure OSPF Routes

configure

router ospf process-id

router-id ip-address

area area-id

exit

Example

The following is a sample of configuring OSPF routes.

```
configure
interface MgmtEth0/RP0/CPU0/0
ipv4 address 10.1.1.2 255.255.255.0
!
interface MgmtEth0/RP0/OSC1/0
shutdown
!
interface MgmtEth0/RP0/OSC2/0
ipv4 address 10.1.3.2 255.255.255.0
!
interface MgmtEth0/RP0/OSC3/0
ipv4 address 10.1.4.2 255.255.255.0
```

```
!
router ospf remote
router-id 10.1.1.2
area 0
interface MgmtEth0/RP0/CPU0/0
passive enable
!
interface MgmtEth0/RP0/OSC2/0
!
interface MgmtEth0/RP0/OSC3/0
!
!
!
end
```

Verify OSPF Routing Table

RP/0/RP0/CPU0:ios# show ospf routes

```
Sat Jul 29 09:54:25.937 UTC
Topology Table for ospf local with ID 10.1.4.1
Codes: O - Intra area, O IA - Inter area
      O E1 - External type 1, O E2 - External type 2
      O N1 - NSSA external type 1, O N2 - NSSA external type 2
    10.1.1.0/24, metric 1
0
      10.1.1.2, directly connected, via MgmtEth0/RP0/CPU0/0
0
    10.1.3.0/24, metric 1
      10.1.3.2, directly connected, via MgmtEth0/RP0/OSC2/0
0
    10.1.7.0/24, metric 2
      10.1.3.1, from 10.58.227.198, via MgmtEth0/RP0/OSC2/0
    10.58.227.0/24, metric 1
Ο
      10.1.3.1, from 10.58.227.198, via MgmtEth0/RP0/OSC2/0
```

Troubleshooting Network Issues

Troubleshooting must be performed by checking the status of the interfaces, subnets, static routing, and OSPF sections.

Problem	Command
Interfaces are in down state	show interfaces MgmtEth rack/slot/instance/port
Route to default gateway is not defined	show running-config
Wrong IP addresses or subnet are planned in design phase	show running-config
Wrong static routes are defined that overwrite OSPF routes	Compare the output of show ip route command with show ospf routes command
Interfaces are not added in the OSPF section configured	show running-config

Problem	Command
Interfaces are in passive mode in the OSPF section configured	show running-config

Troubleshooting UDC Port Configurations

Table 5: Feature History

Feature Name	Release	Description
Troubleshooting User Data Channel (UDC) Port Configurations	Cisco IOS XR Release 7.8.1	The hw-module and show hw-module commands have been enhanced with additional keywords to improve the troubleshooting of issues on UDC ports. Apart from viewing the UDC port state, VLAN list, and port statistics, you can clear UDC port configurations and enable or disable configurations on each UDC port.

From Release 7.8.1, the following commands are introduced to troubleshoot the UDC ports and view the configurations:

- hw-module eth-switch
- show hw-module eth-switch

Use the hw-module eth-switch command to enable, disable, or clear the UDC port configurations in the configuration mode.

To clear the configured statistics of UDC port 1, use the following commands:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module eth-switch clear-stats port Rj45Udc1
RP/0/RP0/CPU0:ios(config)#commit
```

To clear the configured statistics of **all** ports, use the following commands:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module eth-switch clear-stats all
RP/0/RP0/CPU0:ios(config)#commit
```


Note The hw-module eth-switch clear-stats... command not only clears all the counters on the selected port but also turns off the clear-on-Read attribute that clears the port statistics when reading the statistics information. You can re-enable clear-on-Read with the enable-clear-on-read attribute.

Use the show hw-module eth-switch command to display information that is related to the port state, VLAN lists, and port statistics.

To view the configured attributes of the UDC ports, use the following command:

RP/0/RP0/CPU0:ios#show hw-module eth-switch ports-attrs

The following output shows the attributes of all the configured ports.

```
Thu Nov 10 13:24:16.932 CET
Ports Attributes:
```

Port	SfpUdc3	#	0	(enable)	Link	UP	Full-Duplex	9604	[1	Gbps]	6(1000BASE_X)
C1	ear-On-Re	ac	1								
Port	SfpUdc2	#	4	(enable)	Link	UP	Full-Duplex	9604	[1	Gbps]	6(1000BASE_X)
C1	ear-On-Re	ac	1								
Port	SfpUdc1	#	8	(enable)	Link	UP	Full-Duplex	9604	[1	Gbps]	6(1000BASE_X)
C1	ear-On-Re	ac	1								
Port	Rj45Udc1	#	12	(enable)	Link	DOWN	Half-Duplex	9600	[1	Gbps]	3(SGMII)
Clear	-On-Read										
Port	Rj45Udc2	#	16	(enable)	Link	DOWN	Half-Duplex	9600	[1	Gbps]	3(SGMII)
Clear	-On-Read										
Port			20	(anahla)	T 1	DOM		0600	Γ1	Chnel	3 (SCMTT)
FOLC	Rj45Udc3	Ħ	20	(enable)	LINK	DOWIN	Half-Duplex	9000	1.7	gpb21	5(56411)
Clear	Rj45Udc3 -On-Read	Ħ	20	(enable)	LINK	DOWN	Half-Duplex	9600	11	gpb21	5 (56H11)
Clear Port	RJ45Udc3 - On-Read CpuMgmt	# #	24	(enable)	Link	UP	Full-Duplex	1522	[1	Gbps]	6(1000BASE_X)
Clear Port Port	RJ45Udc3 - On-Read CpuMgmt	# #	24 25	(enable) (enable)	Link Link Link	UP UP	Full-Duplex	1522 1522	[1 [1	Gbps] Gbps]	6(1000BASE_X) 6(1000BASE_X)

To view the counters that are related to the CpuMgmt port, use the following command:

RP/0/RP0/CPU0:ios#show hw-module eth-switch stats port CpuMgmt

The following output displays the counter values for the CpuMgmt port.

Mon May 16 09:10:24.491 UTC

********************* STAR	T ******
PORT MAC COUNTERS - Te	st cmd [1] [Port:0x18]
goodPktsSent	0
goodPktsRcv	0
ucPktsSent	17
ucPktsRcv	2
mcPktsSent	1489
mcPktsRcv	0
brdcPktsSent	349
brdcPktsRcv	1
goodOctetsSent	200863
goodOctetsRcv	474
pkts640ctets	614
pkts65to1270ctets	872
pkts128to2550ctets	86
pkts256to5110ctets	286
pkts512to10230ctets	0
pkts1024tomaxOoctets	0
pkts1024to15180ctets	0

Utilizing the **hw-module eth-switch port <port_name> enable-clear-on-read** command to enable or disable MAC Counters Clear on read, impacts the corresponding port pairs listed below:

- [SfpUdc3 #0, SfpUdc2 #4]
- [Rj45Udc1 #12, Rj45Udc2 #16]

Configuring MAC counters Clear on read for port Rj45Udc1#12 also has an impact on port Rj45Udc2#16, and the opposite way. This behavior is applicable to both ports Rj45Udc1 #12 and Rj45Udc2 #16.

The following configuration example of MAC counters Clear on read on the port Rj45Udc1 shows that the configuration also affects the port Rj45Udc2:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module eth-switch port Rj45Udc1 enable-clear-on-read
RP/0/RP0/CPU0:ios(config)#commit
```

Use the following command to view the hardware module eth-switch port attributes:

#show h	nw-modul	e	etł	n-switch port	ts-att:	ſS				
Ports A	Attribut	es	3:							
Port Sf	EpUdc3	#	0	(enable)	Link	UP	Full-Duple	x 9604	[1 Gbps]	6(1000BASE_X)
Port Sf	EpUdc2	#	4	(enable)	Link	UP	Full-Duple	x 9604	[1 Gbps]	6(1000BASE_X)
Port Sf	EpUdc1	#	8	(enable)	Link	UP	Full-Duple	x 9604	[1 Gbps]	6(1000BASE_X)
Port Rj	j45Udc1	#	12	(enable)	Link	UP	Half-Duplex	9600 [1	Gbps] 3	(SGMII)
Clear-0)n-Read									
	-								-	
Port Rj	j45Udc2	#	16	(enable)	Link	UP	Half-Duplex	9600 [1	Gbps] 3	(SGMII)
Port Rj Clear-C	j45Udc2 Dn-Read	#	16	(enable)	Link	UP	Half-Duplex	9600 [1	Gbps] 3	(SGMII)
Port Rj Clear-O Port Rj	45Udc2 Dn-Read 45Udc3	#	16 20	(enable)	Link Link	UP	Half-Duplex	9600 [1 ex 9600	Gbps] 3	(SGMII) 3(SGMII)
Port Rj Clear-O Port Rj Port Cp	j45Udc2 Dn-Read j45Udc3 DuMgmt	# #	16 20 24	(enable) (enable) (enable)	Link Link Link	UP UP	Half-Duplex Full-Duple Full-Duple	9600 [1 ex 9600 ex 1522	Gbps] 3 [1 Gbps] [1 Gbps]	(SGMII) 3(SGMII) 6(1000BASE_X)
Port Rj Clear-C Port Rj Port Cp Port	j 45Udc2 Dn-Read j45Udc3 DuMgmt	# # #	16 20 24 25	(enable) (enable) (enable) (enable)	Link Link Link Link	UP UP UP	Half-Duplex Full-Duple Full-Duple Full-Duple	9600 [1 x 9600 x 1522 x 1522	Gbps] 3 [1 Gbps] [1 Gbps]	(SGMII) 3(SGMII) 6(1000BASE_X) 6(1000BASE_X)
Port Rj Clear-O Port Rj Port Cp Port Port Rj	j 45Udc2 Dn-Read j45Udc3 puMgmt	# # # #	16 20 24 25 26	<pre>(enable) (enable) (enable) (enable) (enable)</pre>	Link Link Link Link	UP UP UP	Half-Duplex Full-Duple Full-Duple Full-Duple Full-Duple	9600 [1 x 9600 x 1522 x 1522 x 1522	Gbps] 3 [1 Gbps [1 Gbps [1 Gbps [100 Mb]	(SGMII) 3(SGMII) 6(1000BASE_X) 6(1000BASE_X) os] 3(SGMII)